

LUZHINSKIY, V. K., Cand Med Sci -- (diss) "Data on <sup>the</sup> Pharmacology  
of the Field Pink (Multicolored)." Irkutsk, 1957. 16 pp (Tomsk  
State Medical Inst im V. M. Molotov), 200 copies (KL, 47-57, 90)

~~Githago Sagatum~~

63

IUZHS, A.R.

Effect of the use of the ganglion-blocking agent pentaphene, in certain diseases of the gastrointestinal system; preliminary report. Biul. eksp. biol. i med. 40 no.11:45-46 N. '55. (MLRA 9:1)  
1. Iz kliniki propedevniki vnutrennikh bolezney (dir.-deystvitel'nyy chlen AMN SSSR prof. M.D. Tushinskiy) i kursa toksikologii (zav.-prof. M.Ya. Mikhel'son) 1-go Leningradskogo meditsinskogo instituta imeni I.P. Pavlova.

(GASTROINTESTINAL DISEASES, therapy,  
parpanit, clin. & exper. studies)

(MUSCLE RELAXANTS, therapeutic use,  
parpanit in gastrointestinal dis., clin. & exper.)

LUZHIS, A. R., Candidate Med Sci (diss) -- "The effect of the cholinolytic preparations pentaphen and merpanite on certain functions of healthy persons, and the use of these preparations to treat ulcers". Leningrad, 1959. 19 pp (First Leningrad Med Inst im Acad I. P. Pavlov), 200 copies (KL, No 24, 1959, 151)

LUZHIS, A.R., kand.med.nauk

Treatment of acute barbiturate poisoning. Terap.arkh. 33  
no.2:108-112 F '61. (MIRA 14:3)

1. Iz propedevticheskoy terapevticheskoy kliniki (zav. - deyst-  
vitel'nyy chlen AMN SSSR prof. M.D. Tushinskiy) I Leningrad-  
skogo meditsinskogo instituta imeni I.P. Pavlova.  
(BARBITURATES--TOXICOLOGY)

LUZHIS, A.R.; RYSS, Ye.S.

Clinical significance of the determination of uropepsinogen in  
peptic ulcer. Vest. AMN SSSR 18 no.10:60-65 '63.  
(MIKA 17:6)

1. I Leningradskiy meditsinskiy institut imeni Pavlova.

LUZHKOV, A.D.

Ecological and parasitological study of the Arctic fox (*Alopex lagopus* L.) on the Yamal Peninsula. Zool. zhur. 42 no.6:  
964-966 '63. (MIRA 16:7)

1. Zoological Institute of the Academy of Sciences of the  
U.S.S.R., Leningrad.  
(Yamal Peninsula--Parasites--Arctic fox)

LUZHKOV, A.D.

Effective method of catching murine rodents in the tundra. Med.  
paraz. i paraz. bol. 33 no.5:622 S-O '64.

(MIRA 18:4)

1. Leningradskiy nauchno-issledovatel'skiy veterinarnyy institut.

LUZHKOV, A.D.

Endoparasites of leavings and distribution in the Kola  
Peninsula. Med. parazit. i parazit. bol. 33 no. 2:230-231

Mr- Ap'64

(MIRA 28:1)

1. Iz Leningradskogo nauchno-issledovatel'skogo veterinarno-  
go instituta (direktor - dozent V.F. Gusev).



LUZHKOV, F.

Important matter. Voen. znan. 37 no. 1:32-33 Ja '61.

(MIRA 14:1)

1. Nachal'nik Tsentral'nogo kluba sluzhebnogo sobakovodstva  
Dobrovol'nogo obshchestva sodeystviya armii, aviatsii i flotu.  
(Dogs, War use of)

LUZHKOV E. sud'ya vsesoyuznoy kategorii

The Seventeenth All-Union Dog Show. Voen. Znan. 41 no.5:47 My  
'65. (MIRA 18:5)

LUZHKOV, F.M.; NAZAROV, V.P.; NEMTSOV, K.Ya.; ORLOV, A.P.; POLTAVETS,  
I.S.; SHAR, Yu.I.; KANEVSKAYA, M.D., red.; MIKHLINA, L.T.,  
tekhn. red.

[Keeping and training working dogs] Soderzhanie i dressi-  
rovka sluzhebnykh sobak. Moskva, Izd-vo DOSAAF, 1963. 227 p.  
(MIRA 16:7)

(Dogs--Training)

LUZHKOV, G.

The task of the whole group. Sov.profsouyuzy 7 no.19:32-37  
0 '59. (MIRA 13:2)

1. Predsedatel' zavodskogo komiteta Kostromskogo mashinostroitel'-  
nogo zavoda imeni Krasina.  
(Works councils) (Efficiency, Industrial)

LUZhKOV, M. A. Cand Agri Sci — (diss) "Effectiveness of Production  
Crossing of Large White and Ukrainian Steppes Pigs with Other  
Breeds in the Crimea," Kishiniev, 1959, 16 pp, 150 copies (Kishinev  
Agricultural Institute im M. V. Frunze) (KL, 47/60, 105)

GREBEN', L.K., akademik; BAYDUGANOVA, Ye.P., nauchnyy sotr.; SAVCHENKO, P.Ye., kand. biol. nauk; GREBEN', Ye.K., kand. sel'khoz. nauk; KRYLOVA, L.F., nauchn. sotr.; SIDOROVA, L.M., nauchn. sotr.; SOROKINA, V.I., nauchn. sotr.; BAGMET', M.I.; LAZORENKO, Ye.L.; KHOKHLYUK, A.G.; PASHKEVICH, M.K.; BRYZHNIK, K.A.; LUZHKOV, M.A., kand. sel'khoz. nauk; BALASHOV, N.T., kand. sel'khoz. nauk; ZHELIKHOVSKIY, V.I., redaktor; POTOTSKAYA, L.A., tekhn. red.

[Ukrainian White Steppe swine] Ukrainskaia stepnaia belaiia poroda svinei. Pod obshchei red. L.K.Grebenia. Kiev, Gos-sel'khozizdat USSR, 1962. 252 p. (MIRA 16:5)

1. Ukrainskiy nauchno-issledovatel'skiy institut zhivotnovodstva stepnykh rayonov im. M.F.Ivanova "Askaniya-Nova."
  2. AN Ukr.SSR i Vsesoyuznaya akademiya sel'skokhozyaystvennykh nauk im. V.I.Lenina (for L.K.Greben').
  3. Ukrainskiy nauchno-issledovatel'skiy institut zhivotnovodstva stepnykh rayonov im. M.F.Ivanova "Askaniya-Nova" (for Bayduganova).
  4. Melitopol'skaya gosudarstvennaya plemennaya stantsiya (for Bagmet, Lazorenko, Khokhlyuk).
  5. Spetsialist sovkhoza "Komsomolets", Stavropol'skiy kray (for Bryzhnik).
- (Ukraine--Swine breeding)

LUZHKOV, M.A.

Centralized supply of petroleum products to the national economy.  
Transp. i khran. nefi no.6:24-27 '63. (MIRA 17:3)

1. Vykhinskaya perevalochnaya neftebaza Moskovskogo upravleniya  
Glavnogo upravleniya po transportu i snabazheniyu nefi'yu i  
nefteproduktama RSFSR.

ACC NR: AP7001518

(N)

SOURCE CODE: UR/0229/66/000/011/0039/0044

AUTHOR: Tokarev, L. N.; Kotovshchikov, A. Ya.; Luzhkov, M. A.

ORG: None

TITLE: On the possibility of using current-limiting reactors for increasing the power of marine electric plants

SOURCE: Sudostroyeniye, no. 11, 1966, 39-44

TOPIC TAGS: electric generator, marine engineering, electric power plant

ABSTRACT: The authors consider the problems involved in limiting the short-circuit current of marine electric power systems by using reactors connected between the sections of the generator distribution panels and discuss the stability of parallel operation of generator units separated by reactors. The problem of maintaining steady voltage while transmitting power through the reactors was investigated in full-scale tests of a power plant consisting of two MS-82--4 synchronous machines with a P92DC drive, and mathematical simulation of parallel operation of two and three TMV-2--2 turbogenerators. It was found that the power of parallel operating generators in marine AC power plants may be increased by at least 10-15 mw with presently available commutation equipment by using current-limiting reactors permanently connected in the power circuits. The use of reactors increases the reliability of power delivery dur-

Card 1/2

UDC: 629.12-83



ACC NR: AP7001518

ing short circuits and also makes it possible to maintain voltage close to the rated value in the distribution panel sections separated from the short-circuit point by the reactors. Reactors in the power plant circuit cause no problems in voltage and frequency control and do not disrupt the operation of systems for distributing the active load. The use of circuits with reactors is especially recommended in electric power plants with compensation of  $\cos\phi$  in the generator load. These reactors are also applicable to electric installations of medium and low power. Orig. art. has: 7 figures.

SUB CODE: 09, 10, 13/ SUBM DATE: None/ ORIG REF: 001

Card 2/2

BALASHOV, M.T., kand.sel'skokhoz.nauk; PALAMARENKO, I.K., kand.sel'skokhoz.  
nauk; SAVCHENKO, P.Yu., kand.biolog.nauk; LUZHKOV, M.O., nauchnyy sotrudnik

Comparative studies on some biological characteristics of hybrid  
swine. Nauk.pratsi "Ask.-Nov." 9:3-9 '61. (MIRA 15:3)  
(Swine breeding)

S/191/60/000/005/015/020  
B004/B064

AUTHORS: Parlashkevich, N. Ya., Derkovskaya, I. L., Luzhkov, Yu. M.,  
Bil'dina, V. P.

TITLE: Automatic Control and Regulation of the pH in the Production  
of Urea Formaldehyde Resins

PERIODICAL: Plasticheskiye massy, 1960, No. 5, pp. 56-59

TEXT: Two continuous methods of producing urea formaldehyde resins are briefly described: A) Partial condensation of the urea formaldehyde mixture in the first stirrer, finishing of condensation in a second one attached below, at  $\text{pH} = 4.5 \pm 0.2$ , and stabilization in the third stirrer at  $\text{pH} = 7.5 - 8.0$ . B) Production of the urea formaldehyde mixture at a molar ratio of 1 : 2, addition of NaOH until a pH of 5.2 has been reached, continuous flow of the mixture into the reaction vessel where condensation takes place at  $110-120^{\circ}\text{C}$  with addition of diethylene glycol, and stabilization in a third vessel at  $\text{pH} = 7.0 - 7.5$ . The following electrodes were used to regulate the pH: 1) glass electrodes with high-ohmic pH-meter system Ts.L.A. (Central Automation Laboratory); 2) antimony electrodes of the CY-0 (SU-0) type with ЭПД-12 (EPD-12) or ЭПД-32 (EPD-32) potentiometer. Card 1/2

Automatic Control and Regulation of the pH  
in the Production of Urea Formaldehyde  
Resins

S/191/60/000/005/015/020  
B004/B064

meters, the measuring range of which was extended to 200-600 mv in accordance with the instruction given by the Moskovskiy zavod "Manometr" (Moscow "Manometr" Plant), "Electronic Automatic Potentiometers and Bridges". Stable values of measurement were obtained from tests of glass electrodes at 95°C and a pH between 7.15 and 7.7, from antimony electrodes at the same temperature and pH = 5.1 and 5.6. The reference electrode was in both cases a calomel electrode in saturated KCl solution connected with the reaction vessel by a semi-permeable membrane. Either an electromagnetic control valve of the ЭС1-5101 (ES1-5101) type or a pneumatic dosing device of stainless steel were used for control. The practical test which was jointly carried out by I. S. Shentsis, T. S. Ivanovskaya, V. A. Morozov, L. I. Panikova, and V. A. Rodionov confirmed the good efficiency of automatic pH control. There are 7 figures and 2 references: 1 Soviet, 1 US, and 1 German. ✓

Card 2/2

S/081/61/000/022/064/076  
B101/B147

AUTHORS: Parlashkevich, N. Ya., Luzhkov, Yu. M., May, A. V.,  
Volchek, I. S., Kogan, I. N., Pubinshteyn, V. V.,  
Vurzel', F. B.

TITLE: Some problems of automatic control and regulation in  
phenol-formaldehyde resin production

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 22, 1961, 444, abstract  
22P8 (Mekhaniz. i avtomatiz. proiz-va, no. 3, 1961, 17 - 20)

TEXT: Concentration of catalyst in phenol-formaldehyde resin (PFR) and  
viscosity are the most important characteristics determining the con-  
densation process and the quality of the finished product. The authors  
describe schemes for controlling the catalyst concentration in continuous  
production processes of PFR, basing on a change in the electrical con-  
ductivity of the mixture, which evidently depends on the concentration of  
the hydrochloric or oxalic acid in the mixture. For the automatic control  
of PFR viscosity, they suggest the use of an ultrasonic viscosimeter. A  
diagram for the continuous control of viscosity is given. [Abstracter's  
note: Complete translation.]

Card 1/1

L 14532-63 EPR/EWP(j)/EPF(c)/EWT(m)/BDS/ES(s)-2 AFFTC/ASD/SSD Ps-4/  
 Pc-4/Pr-4/Pt-4 Rm/WW/MAY  
 ACCESSION NR: AF3004778 S/0191/63/000/008/0060/0061 85  
 84

AUTHOR: Luzhkov, Yu. M.; Volchek, I. S.; Krichmar, G. Ya.; Ramzaytsev, V. D.;  
Vishnyak, Yu. I.; Parlashkevich, N. Ya.

TITLE: Automatic device for determining the thermal stability of polymers 15

SOURCE: Plasticheskiye massy\*, no. 8, 1963, 60-61

TOPIC TAGS: thermal stability, polymer thermal stability, polyformaldehyde  
 thermal stability, degradation, polymer degradation, weight change, weight-  
 change measurement, automatic weight-change measurement, weight recording,  
 automatic weight recording, photohead, automatic device

ABSTRACT: A device for the automatic measurement and recording of weight changes  
 during the degradation of polymeric materials has been developed at NIIPM. It  
 consists of an ADV-200 balance, a photoelectric servomechanism, a reversible  
 motor, a measuring slide wire, an electromagnetic balancing system, and a re-  
 cording device. A schematic and the circuit diagrams of the device are shown  
 in Figs. 1 and 2 of the Enclosure. In operation, the photohead tracks the posi-  
 tion of the balance pointer. Unbalance changes the ratio of illuminated to dark

Card 1/5

L 14532-63

ACCESSION NR: AP3004778

area in the photoresistor, causing its resistance to change. An unbalance signal is sent to the input of the amplifier of the servomechanism. The new device was used for determining the thermal stability of polyformaldehyde. 16.  
A characteristic degradation curve for this material at 222C recorded with the device is shown in Fig. 3. Orig. art. has: 5 figures.

ASSOCIATION: none

SUBMITTED: 00

DATE ACQ: 28Aug63

ENCL: 03

SUB CODE: CH, MA

NO REF SOV: 003

OTHER: 001

Card 2/5

ACCESSION NR: AP4009840

S/0191/64/000/001/0063/0071

AUTHORS: Ramzaytsev, V.D.; Volchek, I.S.; Dvorkina, T.V.; Krichmar, G. Ya.; Luzhkov, Yu. M.; Frenkel', M.D.

TITLE: Experimental automation of plastic testing for heat resistance

SOURCE: Plasticheskiye massy\*, no. 1, 1964, 68-71

TOPIC TAGS: plastic materials testing device, testing plastics heat resistance, testing plastics deformation

ABSTRACT: Since standard installations for testing heat resistance and deformation of plastic materials are very imperfect, inaccurate, slow and subject to mistakes due to reliance on visual observation, an automatic device programmed for measurement and recording of temperature has been designed. Described in detail, this device, which can be used wherever thermomechanical tests are made as well as in dilatometry, basically consists of an EPP-06M1 potentiometer,

Card 1/2



ACCESSION NR: AP4009840

program controls, measurement and recording of temperature, automatic measurement and recording of deformations, and automatic changes of operation rate. Thermocouples, electronic probes, amplifiers, differential transformer induction systems, and measuring bridges are used in the circuit and their functions are also described. Orig. art. has 7 figures, no formulas, no tables.

ASSOCIATION: None

SUBMITTED: 00

DATE ACQ: 10Feb64

ENCL: 00

SUB CODE: AP

NO REF SOV: 006

OTHER: 000

Card 2/2

OSTROVSKAYA, A.S.; LUZHKOV, Yu.M.; VOICHEK, I.S.; STREL'TSOV, V.I.

Method of continuous automatic control of the composition of  
technical formalin. Plast. massy no.11:63-65 '64 (MIRA 18:1)

KOGAN, I.N., inzh.; KRICHMAR, G.Ya., inzh.; LUZHKOV, Yu.M., inzh.;  
RUBINSHTEYN, V.V., inzh.

Multipoint ultrasonic viscosimeter. Mekh. i avtom.proizv. 19  
no.2:33-35 F '65. (MIRA 18:3)

LUZHKOVSKIY, Viktor Georgiyevich

[Manual for the study of agricultural machinery] Rukovodstvo po  
izucheniiu sel'skokhoziaistvennykh mashin; uchebnoe posobie dlia  
pedagogicheskikh institutov. Moskva, Ministerstvo prosveshchenia  
RSFSR, 1956. 139 p. (MLRA 10:2)  
(Agricultural machinery)

*LUZHKOVSKIY, Viktor G.*

LUZHKOVSKIY, Viktor Georgiyevich; ULITOVSKIY, Boris Alekseyevich; TSVETNIKOV,  
Viktor Ivanovich; DUBROVSKIY, V.A., red.; SMIRNOV, G.I., tekhn.red.;  
SHCHEPTEVA, T.A., tekhn.red.

[Practical work on trucks and tractors; a manual for normal schools]  
Praktikum po avtotraktornomu delu; uchebnoe posobie dlia pedinstitutov.  
Moskva, Gos. uchebno-pedagog. izd-vo M-va prosv. RSFSR, 1957. 166 p.  
(Tractors) (Motortrucks) (MIRA 11:2)

GITSU, D.V.; IVANOV, G.A.; LUZHKOVSIIY, V.G.

Microhardness of bismuth alloys and its relation to the electric characteristics of these alloys. Uch.zap.Ped.inst.Gerts.no.207: 45-50 '61.

(MIRA 16:5)

1. Leningradskiy gosudarstvennyy pedagogicheskiy institut imeni A.I. Gertsena.

(Hardness) (Bismuth alloys—Electric properties)

LUZHKOVSKIY, V. G.  
LUZHKOVSKIY, V. G.

"The Effect of Temperature on the Elasticity of Crystals of Haloid Compounds of Alkali Metals," pp 75-84, ill, 5 ref

Abst: The article is concerned with a study of temperature relationship of elasticity limits on contraction, determined by optical methods, for a number of single crystals of alkali metals (lithium fluoride, sodium fluoride, sodium chloride, potassium chloride, potassium iodide).

SOURCE: Uchenyye Zapiski Lenigr. Gos. Pedagog. In-ta Min-va Prosveshcheniya RSFSR (Scientific Notes of the Leningrad State Pedagogical Institute of the Ministry of Education RSFSR), Volume 17 -- Physics-Mathematics Faculty, No 2, Leningrad, 1957

Sum 1854

S/137/62/000/007/055/072  
A057/A101

AUTHORS: Gitsu, D. V., Ivanov, G. A., Luzhkovskiy, V. G.

TITLE: The microhardness of bismuth alloys and its relation to electrical characteristics of these alloys

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 7, 1962, 66, abstract 7I424  
("Uch. zap. Leningr. gos. ped. in-ta im. A. I. Gertsena", 1961, 207, 45 - 50)

TEXT: An investigation of the microhardness of Bi-Te and Bi-Sn-Te alloys, carried out with pressed samples, indicates apparently, that the microhardness of alloys containing a small amount of admixture is determined principally by changes of electron concentration effected by this admixture, rather than by the number of admixture atoms.

T. Rumyantseva

[Abstracter's note: Complete translation]

Card 1/1



LUZHNA, R. M.: Master Med Sci (diss) -- "The treatment of ulcers of the cornea with Gordeyev's solution". Kiev, 1958. 20 pp (Kiev Order of Labor Red Banner State Med Inst im Acad A. A. Bogomolets), 2000 (sic) copies (KL, No 6, 1959, 145)

LUZHNAYA, N. F.

"Exchange reactions and their application to semiconductor compound crystallization."

report presented at the Gordon Research Conf on Chemistry & Metallurgy of Semiconductors, Tilton, N.H., 24-28 Aug 64.

Inst of General & Inorganic Chemistry, Moscow.

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<p><i>ca</i></p> <p>Influence of sodium chloride on the synthesis of cyanides in nitrogen fixation from the air. N. N. STASHVICH, N. P. LUZHMAYA AND B. G. KARNAUKHOV. <i>Zhur. Priklad. Khim.</i> 4, 237-54(1931)—Presence of NaCl increases the yield of cyanide in its synthesis from <math>\text{Na}_2\text{CO}_3</math>, C, <math>\text{Fe}_2\text{O}_3</math> and atm. <math>\text{N}_2</math> because of its protective action. The best results were obtained with <math>\text{NaCl}:\text{Na}_2\text{CO}_3 = 1:1</math>. V. KALICHEVSKY</p>																																																			
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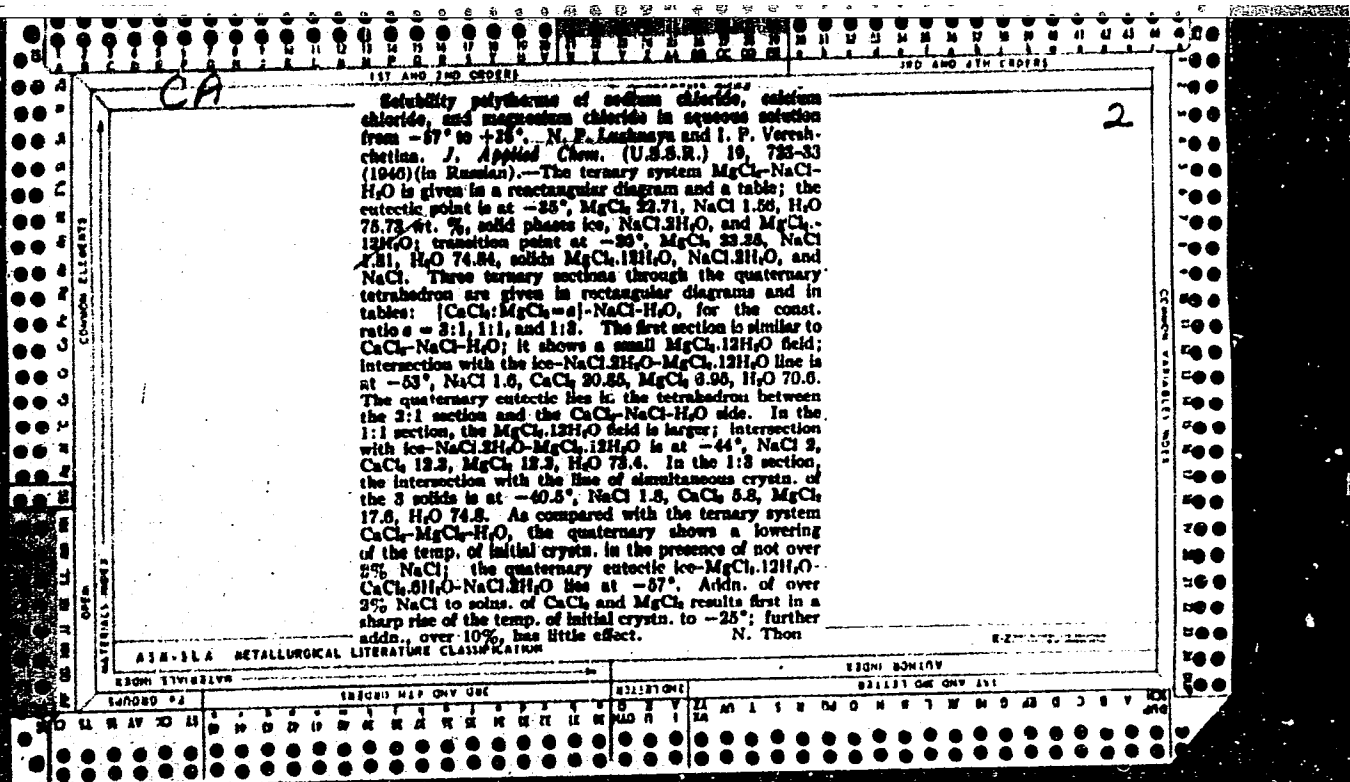
ca

Physicochemical study of the multistage decomposition of carmalum. A. P. Palkin, N. P. Lushnaya, M. A. Opuikhtina and B. N. Fedchenko. *Trans. State Inst. Applied Chem.* (U. S. S. R.) 1933, No. 18, 32 G. The phys. consts. of different helvia were detd. Cf. preceding abstr. Chas. Blane

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1ST AND 2ND ORDER		PROCESSES AND PROPERTIES INDEX		MATERIALS INDEX	
<p><i>Ca</i></p> <p><b>Nature and structure of microdispersed mixed crystals in the system ammonium chloride-cobalt chloride-water.</b>  N. S. Kurnakov, N. P. Lushnaya and V. G. Kurnetsov.  <i>Bull. acad. sci. U. R. S. S., Classe sci. math. nat., Sér. chim.</i> 1937, 577-605 (in German 605-6).—Solv. isotherms of the system <math>\text{NH}_4\text{Cl}-\text{CoCl}_2\cdot 2\text{H}_2\text{O}</math> were investigated at 25° and 50°. On the basis of these isotherms as well as x-ray analysis, crystalloptic study and sp. gr. measurement of the solid phases involved, it is concluded that there exists the double salt <math>2\text{NH}_4\text{Cl}\cdot\text{CoCl}_2\cdot 2\text{H}_2\text{O}</math> and 2 series of mixed crystals, those of the <math>\alpha</math>-type consisting of a true solid soln. of <math>\text{CoCl}_2\cdot 2\text{H}_2\text{O}</math> or of <math>2\text{NH}_4\text{Cl}\cdot\text{CoCl}_2\cdot 2\text{H}_2\text{O}</math> in <math>\text{NH}_4\text{Cl}</math>, with the double salt distributed through the crystals also in a state of microdispersion, and those of the <math>\beta</math>-type consisting of a solid soln. of the double salt in <math>\text{NH}_4\text{Cl}</math>, with <math>\text{CoCl}_2\cdot 2\text{H}_2\text{O}</math> in a state of microdispersion. Thirty-two references. S. L. M.</p>					
<p>ASH-SLA METALLURGICAL LITERATURE CLASSIFICATION</p>					



LUZHNAYA, N. P.

PA 27/49T28

USSR/Chemistry - Systems, Ternary Jan/Feb 49  
Chemistry - Solubility, Diagrams of

"Microdispersed Solid Solutions in the System  
 $\text{NH}_4\text{Cl} - \text{FeCl}_2 - \text{H}_2\text{O}$ ," N. P. Luzhnaya, Inst Gen and  
Inorg Chem imeni N. S. Kurnakov, Acad Sci USSR, 8 pp

"Iz Ak Nauk SSSR, Otdel Khim Nauk" No 1

Investigates solubility diagram of  $\text{NH}_4\text{Cl} - \text{FeCl}_2 - \text{H}_2\text{O}$  at  $35^\circ$ . Shows that the solid stages form two series of microdispersed solid solutions, components of which are aluminum chloride and the binary salt  $2\text{NH}_4\text{Cl} \cdot \text{FeCl}_2 \cdot 2\text{H}_2\text{O}$ . Solid solutions of these salts belong to anomalous types and have fine mosaic structure. Submitted 15 Apr 48.

27/40708



LUZHNAYA, Nina Petrovna

"Microdisperse Salt Systems," Vest. Ak. Nauk SSR, 9, 1949.

Inst. Gen. & Inorganic Chem. im. N. S. Kurnakov, Dept. Chem. Sci., AS (Mor. -1941-1949-).

Feasibility in the system of chlorides and sulfates of sodium, potassium, and zinc. N. V. Lashinaya and I. P. Vereshchetina. *Zhur. Priklad. Khim.* (J. Applied Chem.) 22, 933-944 (1949).—In the reciprocal system Na-K-Zn-Cl- $\text{SO}_4$ , represented by a triangular prism, and divided by 2 diagonal sections,  $\text{ZnSO}_4$ -NaCl-KCl and  $\text{ZnSO}_4$ -K $\text{SO}_4$ -NaCl into 3 tetrahedrons, the lowest m. temps. are in the tetrahedron  $\text{ZnSO}_4$ -ZnCl $_2$ -NaCl-KCl. Binary and ternary systems, along diagonals and sections in this tetrahedron, were investigated. Pure  $\text{ZnSO}_4$  under atm. pressure is decompl. before melting. However, with 14 mol. % 2KCl added, the binary system fuses to a homogeneous transparent melt from which 1st crystals sep. at 443°. Further addn. of KCl lowers this temp. to 440°, where, with 76.5%  $\text{ZnSO}_4$ , a new solid phase, KCl-ZnCl $_2$ , appears along with  $\text{ZnSO}_4$ . This KCl-ZnCl $_2$  melts concurrently at 489°. Further increase of the KCl content in the melt causes the m. temp. to fall sharply to 293° at 47.5 mol. %  $\text{ZnSO}_4$ ; the melt becomes viscous, very prone to undercooling (down to 100°), and, in the absence of agitation, forms a transparent glass.

There follows a branch with the solid phase 6KCl-ZnSO $_4$  or a ternary compd. The new phase manifests itself by distinct thermal effects at 385° on the heating curve. The following branch corresponds to a yet unidentified solid phase; the last branch is that of KCl. The system NaCl-KCl-ZnSO $_4$  shows, besides the cryst. branches of NaCl and ZnSO $_4$ , branches of the 2 double salts 3 ZnSO $_4$ ·Na $_2$ SO $_4$  and 2 Na $_2$ SO $_4$ ·ZnSO $_4$ , and a branch corresponding to an unidentified ternary compd.; the lowest temp. is 315°. Nine sections were investigated within the system  $\text{ZnSO}_4$ -2NaCl-2KCl which intersects 7 cryst. vol. of the salts: NaCl, KCl, KCl-ZnSO $_4$ , ZnSO $_4$ , 2Na $_2$ SO $_4$ ·ZnSO $_4$ , an unidentified KCl, KCl-ZnSO $_4$ , ZnSO $_4$ , an uninterrupted series of solid phase, and 3 ZnSO $_4$ ·Na $_2$ SO $_4$ ; an uninterrupted series of solid phase, is formed along the NaCl-KCl salt. The lowest temp. is reached along the lines of simultaneous crystn. of KCl-ZnSO $_4$  and the unidentified phase, with the ternary point lying at 288°. The region of low temps., 310-400°, extends from about 40 to 70 mol. % ZnSO $_4$ ; throughout this region, there is a tendency to undercooling and vitrification. Melts of ZnSO $_4$  with NaCl and KCl are not hygroscopic. The inner section 2NaCl-KCl-ZnSO $_4$ -KCl-ZnCl $_2$  consists of a broad field of NaCl, a smaller field of KCl-ZnSO $_4$ , and a still smaller field of KCl-ZnCl $_2$ ; there is, further, a not yet identified 4th phase. The low-temp. (300-400°) range is relatively narrow and is contiguous to the KCl-ZnSO $_4$  corner. There are 2 ternary points. Small addns. of K $_2$ CrO $_4$  and Na $_2$ CrO $_4$  do not lower the m. temps. of the melts investigated. ZnO (0.5%) does not dissolve in the melts even at 650°. On solidification, melts with ZnO added form milky glasses. The following compns. (in wt. %) are recommended for const.-temp. baths for metallurgical purposes: ZnSO $_4$ , 53.0; NaCl, 47 (289°); ZnSO $_4$ , 52.5; NaCl, 37.2 (305°); ZnSO $_4$ , 48.0; KCl, 22 (375°); ZnSO $_4$ , 49.5; KCl, 50.5 (385°); ZnSO $_4$ , 44.0; KCl, 38.0; NaCl, 20.0 (375°); ZnSO $_4$ , 45.0; KCl, 25.0; NaCl, 20.0 (390°); ZnSO $_4$ , 42.0; ZnCl $_2$ , 10.0; KCl, 30.0; NaCl, 18.0 (375°); ZnSO $_4$ , 45.0; KCl, 21.0; NaCl, 16.0; K $_2$ SO $_4$ , 18.0 (370°); ZnSO $_4$ , 50.0; KCl, 23.0; NaCl, 18.0; Na $_2$ SO $_4$ , 9.0 (396°); ZnSO $_4$ , 50.0; Na $_2$ SO $_4$ , 2.0 (400°).

Effect of the dimensions of ionic radii on the formation of double heteronuclear salts. N. P. Luzhnyaya. *Doklady Akad. Nauk S.S.S.R.* 69, 809-11 (1947). Double salts of the anhyd. kainite ( $\text{KCl} \cdot \text{MgSO}_4$ , m.  $920^\circ$ ) type can be obtained with certain pairs of salts, e.g.  $\text{KCl} \cdot \text{ZnSO}_4$ , m.  $488^\circ$ , also by replacing K by Rb, Cs, or Tl, and by replacing Cl by Br or I. Replacement of K by Na or Li, or of Mg by Ca, Cd, or Pb, prevents the formation of a kainite. The elec. cond. of fused binary systems of salts capable of forming a kainite has a sharp min. at the mol. ratio 1:1, which indicates a decrease of the no. of ions, i.e. persistence of the complex ions characteristic of a kainite even in the fused state. A plausible formulation of the electrolytic disson. of a halide-sulfate kainite  $\text{M}^1\text{X} \cdot \text{M}^{II}\text{SO}_4$  is  $(\text{M}^1)^+$  and  $[\text{XM}^{II}\text{SO}_4]^-$ . The formation of a kainite is thus contingent on the relative attractions of  $(\text{M}^1)^+$  and  $(\text{M}^{II})^{++}$  for  $\text{X}^-$ , and is detd. by the generalized moment  $\mu = Z/r$ , where  $Z$  = charge, and  $r$  = radius of the ion. In the series of salt pairs formed by KCl with  $\text{MgSO}_4$ ,  $\text{ZnSO}_4$ ,  $\text{MnSO}_4$ ,  $\text{CdSO}_4$ ,  $\text{CaSO}_4$ , and  $\text{PbSO}_4$ , in which only  $\text{M}^{II}$  varies, kainite formation occurs only in the first 3 instances, where  $\mu > 2$ ; i.e., formation of kainite is favored by a smaller size of the  $(\text{M}^{II})^{++}$  ion. Conversely, in series in which  $\text{M}^1$  varies, a large size of the  $(\text{M}^1)^+$  ion is conducive to kainite formation; small ions such as  $\text{Li}^+$  or  $\text{Na}^+$  hold the halide ion too strongly to allow formation of the complex kainite anion. Of the halogens, only  $\text{F}^-$  is too small to be held in the complex anion. It is not known yet whether the salt pairs  $\text{CaBr} \cdot \text{CaSO}_4$  (large  $\text{Ca}^+$ , large  $\text{Ca}^{++}$ ) and  $\text{LiCl} \cdot \text{BeSO}_4$  (small  $\text{Li}^+$ , small  $\text{Be}^{++}$ ) are capable of forming a kainite.

N. Thon

N. S. Kurnakov Inst. of General and Inorg. Chem., USSR AS.

LUZHNAYA, N. P.

Doc Chem Sci

Dissertation: "Nature and Structure of the Microscopically Dispersed Solid  
Solutions of Salts." 22/11/50

Inst of General and Inorganic Chemistry imeni N. S. Kurnakov, Acad Sci USSR

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LUZHAYA, N.P.

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/ Structure and properties of microdispersed solid solutions  
of salts. N. P. Luzhaya. *Izvest. Sektora Fiz.-Khim.*  
*Anal., Akad. Nauk S.S.S.R.* 20, 212-26 (1950). — The pur-  
pose of this investigation was to show that microdispersed  
solid solns., so-called "anomalous," are a transition be-  
tween coarsely dispersed solid solns. and true molecularly  
dispersed solid solns. To this end, the literature on iso-  
morphism and mixed crystn. beginning with Mitscherlich  
(1819) is critically reviewed. M. Horch

LUZHANSKYA, N.P.

✓ Bergman, A. G., and Luzhnsaya, N.P.: Fiziko-khimi-  
cheskie osnovy izucheniya i ispol'zovaniya solyanykh  
mestorozhdeniy khlord-sulfatnogo tipa. (Physicochemical  
Bases for the Study and Exploitation of Chloride-Sulfate  
Salt Deposits.) Inst. Obshchey i Neorg. Khim. im. N. S.  
Kurnakov. 1961. 22 pp. r. 14, k. 90.

*lyuzhni*

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177T13

LUZHAYAYA, N. P.

USSR/Chemistry - Potassium Salts of  
Kainite Type

Feb 51

"Investigation of the Specific Gravities of Melts  
in Systems With Congruently Melting Compounds," I. P.  
Vereshchetina, N. P. Luzhnaya

"Zhur Prik Khim" Vol XXIV, No 2, pp 148-153

Studied temp--elec cond--sp gr--mol% diagrams for  
systems  $K_2Cl_2-ZnSO_4$ ,  $K_2Br_2-ZnSO_4$ ,  $Tl_2Cl_2-ZnSO_4$ , and  
 $K_2SO_4-ZnSO_4$  at temp of 475-550°C. Showed that con-  
gruently melting compd appear more or less sharply  
on sp gr--mol% curves; but that sp gr only is not  
sufficient to indicate existence of such compd.

177T13

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CA

Specific gravities of molten salts in systems of congruently fusing compounds. I. P. Vereshchetina and N. P. Lushchikova. *J. Applied Chem. U.S.S.R.* 24, 105-8 (1951) (Engl. translation).—The systems  $K_2Cl_2-ZnSO_4$ ,  $K_2Br_2-ZnSO_4$ ,  $Tl_2Cl_2-ZnSO_4$ , and  $K_2SO_4-ZnSO_4$  were examd. by the method of hydrostatic weighing at temps. between 475 and 550°; congruently fusing compds. are indicated on the sp. gr.-compn. curves. In the system  $K_2Cl_2-ZnSO_4$ , marked changes in direction of the curves occurred corresponding to the compns.  $KCl.ZnSO_4$  and  $3K_2Cl_2.ZnSO_4$ . The system  $K_2Br_2-ZnSO_4$  yields curves showing a sharp min.

at the compn.  $KBr.ZnSO_4$ . Curves of the system  $Tl_2Cl_2-ZnSO_4$  exhibit a slight change of curvature near the compn.  $TlCl.ZnSO_4$ . Two congruently fusing compds.  $ZnSO_4.K_2SO_4$  and  $2ZnSO_4.K_2SO_4$  are shown in the curves of the system  $K_2SO_4-ZnSO_4$ . James C. Eubanks



LUZHNAYA, N.P.; LUK'YANOVA, Ye.I.; URAZOV, G.G., akademik.

Types of waters of the lakes of Uzboy. Dokl. AN SSSR 90 no.5:791-793 Je  
'53. (MLRA 6:5)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurpakova Akademii  
nauk SSSR (for Luzhnaya, Luk'yanova). 2. Akademiya nauk SSSR (for Urazov).  
(Uzboy Valley--Lakes)

LUZHNAYA, N.P.

Forecasting the movements of anticyclones. Trudy TSIP no.69:66-85  
'58. (MIRA 11:6)

(Cyclones)

3(7)

AUTHOR:

Luzhaya, N. P.

SOV/30-53-7-2/20

TITLE:

On the Problem of Displacement of Anticyclones (K voprosu o peremeshtenii antitsiklonov)

PERIODICAL:

Meteorologiya i gidrologiya, 1959, No 7, pp 14 - 20 (USSR)

ABSTRACT:

In her paper (Ref 2), the author of the present paper, on the basis of investigations for checking the rules of the guide current at 546 anticyclones, showed that the trajectory of the anticyclones on the earth's surface rarely (in about 13% of the cases) coincides completely with the direction of the geostrophic wind in the troposphere above the centers of the anticyclones. In most cases (about 75%), the anticyclones move with a noticeable deviation to the left from the direction of the level lines. - The magnitude of the angle varies in wide limits, and attains 45° and more in 10% of the cases. The values of the coefficient K (ratio between the displacement rate of the anticyclones and the speed of the geostrophic wind above its center) also vary in wide limits (from 0.1 to 2.0 and more). Table 1 shows the K-values at different wind speeds above the central part of the anticyclone. In the paper (Ref 2) it was also shown that much better results are obtained in forecasting the displacement of anticyclones on the earth's surface by applying the

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On the Problem of Displacement of Anticyclones

SOV/50-59-7-2/20

method of "transport" of the baric centers not to the  $AT_{700}$  and  $AT_{500}$  level lines but to the lines of the unvarying function  $B$  built up for  $AT_{500}$ . The values  $B_{500}$  characterize the value of the geopotential  $H_{500}$  averaged by the surfaces. As, however, considerable errors in determining the anticyclone speeds also occur in this kind of forecast, the task was set up here to establish accurate directives for the forecast of the displacement rate of anticyclones by the level lines and by the isoclines  $B_{500}$ . For this purpose, also the temperature field on the different levels of the troposphere was investigated besides the wind field above the anticyclones. It was found that the variation in the rate of this displacement, at the same wind speed in the altitudes, depends on the intensity of the temperature advection in the troposphere at the front and back of the anticyclones. The value  $S$  was determined in order to ascertain the quantitative connection between the expected rate of anticyclone displacement, the wind speed in the troposphere above the anticyclones, and the advective changes of temperature at the front and back of the anticyclones at different altitudes.  $S$  is the change of air temperature along the current at the front and back of the

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On the Problem of Displacement of Anticyclones

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anticyclone on different isobaric surfaces at the initial point of time. S was then compared with the displacement rate of the anticyclone in the subsequent 24 hours.- The method of computing S is pointed out here, and table 2 shows the frequency (in %) of the different S-values on the main isobaric surfaces. The S-values obtained were compared in each case (of the 153 cases investigated) with the coefficient K. Table 3 shows the connection between S and K.- The investigations carried out show that the method of forecasting the displacement of anticyclones by a "transport" of their centers along the B<sub>500</sub> isolines offers an evident advantage over the one along the AT<sub>700</sub> level lines. A consideration of the air temperature along the current above the front and back of the anticyclone at the initial point of time on the 850, 700 and 200 mb levels permits a more accurate forecast of the displacement rate of anticyclones to be carried out. There are 5 figures, 1 table, and 3 Soviet references.

Card 3/3

MINYEVA, M.N., LUZHNAIA, N.P.

Accuracy of temperature forecasts for Moscow. Trudy TSIP no.95:32-  
61 '60. (MIRA 13:8)

(Moscow--Atmospheric temperature)  
(Weather forecasting)

LUZHNAYA, N. P. Cand Geog Sci -- "Forecast of the shifting of anticyclones."  
Mos, 1961 (Main Administration of the Northern Sea Route of the Min of Maritime  
Fleet USSR. Arctic and Antarctic Sci Res Inst). (KL, 4-61, 189)

LUZHNNAYA, N-P

6

✓ 3827 AEC-44-2413  
ELECTRIC CONDUCTIVITY, VISCOSITY AND DENSITY OF  
THE FUSED BINARY SALT SYSTEMS WITH A SIMPLE  
EUTECTIC: I. P. Vereshchagina and N. P. Luzhnaia.  
Translated from Izvest. Sektora Fiz. Khim. Akad. Inst.  
Obshchei Neorg. Khim. Akad. Nauk S.S.S.R. 25, 168-207  
(1954): 43p.

②

Row 1st



LUZHNAYA, N.P.; VERESHCHETINA, I.P.

Interaction of zinc sulfate potassium halides in melts. Izv.Sekt.  
fiz.-khim.anal. 24:192-203 '54. (MLRA 8:4)

1. Institut obshchey i neorganicheskoy khimii imeni N.S.Kurnakova  
Akademii nauk SSSR.  
(Zinc sulfate) (Potassium salts)

LUZHNYAYA, N. P.

✓ Conductivity, viscosity, and density of fusions of binary  
C salt systems with simple eutectic. L. P. Verzhichetina and  
N. P. Luzhnyaya, *Izvest. Sektora Fiz.-Khim. Anal. Inst.*  
*Chim. Akad. Nauk S.S.S.R.* 25, 188-207  
(1984). — Fusions of  $\text{NaNO}_3$ - $\text{NaCl}$ ,  $\text{BaCl}_2$ - $\text{NaCl}$ , and  $\text{CaCl}_2$ -  
 $\text{NaCl}$  systems were studied. Isotherms of mol. vol. compn.  
are straight lines for the  $\text{NaNO}_3$ - $\text{NaCl}$  system, slightly con-  
cave for the  $\text{BaCl}_2$ - $\text{NaCl}$  system, and slightly convex (from  
compn. xis) for the  $\text{CaCl}_2$  system. Isotherms of viscosity  
have more distinct max. at lower temps. Isotherms of  
cond. are complex, but in these  $\text{CaCl}_2$  and  $\text{BaCl}_2$  systems are  
related to the viscosity curves.  
Burilla Mayerle

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LUZHAYA, N.P.

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USSR

Solubility isotherms of systems  $K_2CO_3-K_2SO_4-H_2O$  and  
 $KHCO_3-K_2SO_4-H_2O$  at 50°. N. P. Luzhaya and S. M.  
 Kosyachikova. Izvest. Sektora Fiz.-Khim. Anal. Inst.  
 Oshchenei i Teor. Khim., Akad. Nauk S.S.S.R. 25, 345-9  
 (1967). Solubility isotherms of both systems consist of 2 branches

of soly. components, intersecting at eutonic points. Neither  
 compounds, nor solid solus. are observed. Burilla Mayerle

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free

LUZHNAYA, N.P.; KOSYACHKOVA, S.N.

Solubility isotherm 50° for the quaternary system:  $K_2CO_3$ -- $K_2SO_4$ -- $KHCO_3$ -- $H_2O$ . Izv.Sekt.fiz.-khim.anal. 26:259-265 '55. (MIRA 8:9)

1. Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR. (Potassium salts) (Solubility)

LUZHNAYA, Nina Petrovna, doktor khimicheskikh nauk; KIPNIS, S.Ye.,  
redaktor; FURMAN, G.V., tekhnicheskiy redaktor

[Liquid air] Zhidkii vozdukh. Moskva, Izd-vo "Znanie," 1956. 23 p.  
(Vsesoiuznoe obshchestvo po rasprostraneniю politicheskikh i  
nauchnykh znaniy. Ser.3, no.28) (MIRA 9:8)  
(Liquid air)

LUZHNAYA, N.P.; YEVSEYEVA, N.N.; VERESHCHETINA, I.P.

~~Physical properties of salt melts and the nature of their~~  
structural particles. Zhur.neorg.khim. 1 no.7:1490-1500  
J1 '56.

(MLRA 9:11)

(Salts)

LUZHNAYA, N.P.

B-8

USSR/ Physical Chemistry - Thermodynamics. Thermochemistry. Equilibrium.  
Physicochemical analysis. Phase transitions

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 11184

Author : Luzhnaya N.P., Vereshchetina I.P.

Inst : Institute of General and Inorganic Chemistry, Academy of Sciences USSR

Title : Interaction of Zinc Sulfate with Halides of Thallium and Cesium Fusions

Orig Pub : Izv. Sektora fiz.-khim. analiza IONKh AN SSSR, 1956, 27, 285-295

Abstract : By fusibility, electric conductivity and density methods were investigated the systems  $Tl_2Cl_2-ZnSO_4$  (I),  $Tl_2Br_2-ZnSO_4$  (II),  $Tl_2I_2-ZnSO_4$  (III) and  $Cs_2Br_2-ZnSO_4$  (IV), constituting diagonal sections of mutual systems. Determined were compound  $TlCl-ZnSO_4$  undergoes congruent fusion at  $440^\circ$ , eutectic at  $280^\circ$  and 39.52%  $ZnSO_4$ . In systems II and III were found kainites  $TlBr.ZnSO_4$  and  $TlI.ZnSO_4$  melting with decomposition, respectively at  $438$  and  $480^\circ$ . In system IV was found compound  $CsBr.ZnSO_4$ , undergoing congruent fusion at  $502^\circ$ , eutectic at  $420^\circ$  and 50%  $ZnSO_4$ . Molecular volumes and atomic concentrations were calculated. On property isotherms were detected in the proximity of composition of kainites minima and breaks of curves somewhat displaced from ordinate of compound composition.

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LUZHANYA, N.P.

1/ The solubility isotherm of the aqueous system  $\text{NaHCO}_3$  -  $\text{K}_2\text{SO}_4$  at  $50^\circ$ .

+  $\text{K}_2\text{SO}_4$  -  $2\text{KHCO}_3$  +  $\text{Na}_2\text{SO}_4$  at  $50^\circ$ . N. P. Luzhaya and S. N. Kasyachkova. Izvest. Sektsiya Prirodnykh Nauch. Inst. Obshch. i Neorg. Khim., Akad. Nauk S.S.S.R. 27, 353-60 (1953). The solubility in the 3-component systems  $\text{NaHCO}_3$ - $\text{KHCO}_3$ - $\text{H}_2\text{O}$  and  $\text{Na}_2\text{SO}_4$ - $\text{NaHCO}_3$ - $\text{H}_2\text{O}$  indicated no solid solus. or double salts. The solubility isotherm of the aq. system  $\text{Na}_2\text{CO}_3$ - $\text{KHCO}_3$ - $\text{H}_2\text{O}$  has regions of crystn. of the pure components and one compound, glaucite. The  $\text{NaHCO}_3$  range is the largest. The isotherm at  $50^\circ$  is compared with the 0, 20, 25, 30, and  $35^\circ$  isotherms described in the literature.

W. M. Steadberg

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*Luzhnaya, N. P.*

78-2-43/43

AUTHOR: Luzhnaya, N. P.

TITLE: Survey of the Scientific Institutes of the Chinese People's Republic (Khronika. Nauchnyye uchrezhdeniya Kitayskoy narodnoy respublik)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 2, pp.542-545 (USSR)

ABSTRACT: The activity of the Chemical Institute of the Academy of Sciences in the Chinese People's Republic above all refers to the field of anorganic chemistry. The scientific institutes of the Academy of Sciences are the following:  
Institute for Chemistry - Peking  
Institute for Applied Chemistry - Chan-Chun  
Institute for Organic Chemistry - Shanghai  
Institute for Metallurgy and Ceramics - Shanghai  
Institute for Mineral Oils - Dalni  
Institute for Chemical Metallurgy - Peking  
The Institute for Applied Chemistry has 5 laboratories:

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Survey of the Scientific Institutes of the Chinese People's Republic 78-2-43/43

for organic chemistry which predominantly deals with problems of cellulose; for high-molecular compounds; for physical chemistry; for analytical chemistry / S.E., rare elements and complex compounds; for anorganic chemistry.

The Institute for Chemistry and Chemical Complex Compounds also has departments: for organic chemistry, physical chemistry and for anorganic chemistry.

The Institute for Metallurgy and Ceramics has departments for chemical metallurgy and physics of the metals etc.

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Card 2/2

SOV/30-58-11-3/48

5(4)

AUTHORS: Luzhnaya, N. P., Doctor of Chemistry,  
Goryunova, N. A., Candidate of Chemistry

TITLE: Some Problems of the Chemistry of Semiconductors (Nekotoryye problemy khimii poluprovodnikov)

PERIODICAL: Vestnik Akademii nauk SSSR, 1958, Nr 11, pp 17-21 (USSR)

ABSTRACT: A first success in this field was the discovery of semiconductor properties of gray tin by A. F. Ioffe, A. I. Blum, N. A. Goryunova. The prediction and discovery of semiconductor properties of binary compounds of the type of zinc blende (ZnS) showed the great importance of physico-chemical ideas in this field. (A. F. Ioffe, A. R. Regel'). Formally semiconductor chemistry was introduced to the Soviet Union on the occasion of the Eighth All-Union Conference on Semiconductors in Leningrad 1955 by establishing a special section. In order to produce new semiconductors with properties determined in advance the chemical nature of these semiconductors has to be investigated, especially the electron interaction of their atoms. Recently some papers have been published abroad on problems of chemical compounds in semiconductors. In the Soviet

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Some Problems of the Chemistry of Semiconductors

Union these researches have just been started. (A. G. Samoylovich, A. I. Gubanov, Ya. K. Syrkin). Z. G. Pinsker obtained data on the characteristic features of electron density distribution in semiconductors by means of electronography. Semiconductor properties are of great importance in boundary layers of two materials. The physico-chemical analysis is considered as an effective instrument in solving the problems mentioned. Researches on complicated semiconductor systems have been started in the Soviet Union in the Fiziko-tekhnicheskii institut i Institut metallurgii im. A. A. Baykova Akademii nauk SSSR (Physico-Technical Institute and Metallurgical Institute imeni A. A. Baykov AS USSR). These researches were to be developed in the chemical institutes, especially in the Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov) where in 1958 the Laboratoriya fiziko-khimicheskogo analiza poluprovodnikovyykh veshchestv (Laboratory for Physico-Chemical Analysis of Semiconductor Materials) has been established. Such a laboratory is also established in the Institut fiziki i matematiki Akademii nauk Azerbaydzhanskoy SSR (Institute of Physics and Mathematics AS Azerbaydzhanskaya SSR).

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Some Problems of the Chemistry of Semiconductors

Investigations of mechanic properties are to be carried out during the next time in the Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors AS USSR). Also their properties under high temperature are to be examined. Investigation of materials of spinel structure is also of great importance (G. A. Smolenskiy). The correlation method is considered very useful in connection with these researches (V. P. Zhuze). D. A. Petrov, M. S. Mirgalovskaya, developed methods for producing semiconductor materials with high purity degree in form of perfect monocrystals. Papers by I. V. Tananayev, A. V. Novoselova, I. P. Alimarin on this field are mentioned. Finally the authors mention the great importance of semiconductor chemistry for establishing a new technique.

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9,4300 (1143, 1151, 1160)

24.7700 1559, 1395, 1385, 1043

S/063/60/005/005/010/021  
A051/A029

AUTHOR: Luzhnaya, N.P., Doctor of Chemical Sciences

TITLE: A Physico-Chemical Analysis of Semiconductors

PERIODICAL: Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva im. D.I.  
Mendeleeva, 1960, No. 5, Vol. 5, pp. 562-569

TEXT: The author gives a brief outline of the historical development in the field of the semiconductor technique and reviews the works of numerous authors dealing with the structural diagrams of binary, ternary and quaternary systems, the study of various phase properties, and their changes according to temperature, pressure and composition. Recently the application of binary, ternary and more complex compounds with semiconductor properties and also of solid solutions based on these compounds, as well as progress from research to aimed synthesis and the systematic study of new phases led to the more intensive study of the phase diagrams and the establishment of law sequences connecting the change in the semiconductor properties with that of the composition. N.S. Kurnakov is claimed to be the founder of the method

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## A Physico-Chemical Analysis of Semiconductors

of physico-chemical analysis developed further in the USSR (Ref. 1, 2). The physico-chemical analysis has as its purpose the study of properties of various phases formed in the system and their corresponding change with temperature, pressure and composition. The beginning of systematic work in this field was made in 1950 at the fiziko-tekhnicheskiy institut AN SSSR (Physico-Technical Institute of the AS USSR) by N.A. Goryunova (Ref. 9) under the direction of Academician A.F. Ioffe. The rules connecting the crystal-line structure with the physico-chemical properties of phases formed in the systems and having semiconductor properties studied at the institute are given as the characteristic example of its activity in this field. In 1952 works were published (Ref. 10-13) on the investigation into the electrical properties of continuous solid solutions of semiconductor substances. In 1955 work was carried out at the Institut metallurgii AN SSSR (Institute of Metallurgy of the AS USSR) on cobalt antimonides (Ref. 18) which led to a series of investigations into binary and ternary systems including semiconductor compounds. Work on tellurides is being conducted at the Moskovskiy

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### A Physico-Chemical Analysis of Semiconductors

gosudarstvennyy universitet (Moscow State University) (Ref. 19). A study is being made on indium, cadmium and zinc stibides (Ref. 20) at the Voronezhskiy gosudarstvennyy universitet (Voronezh State University). Solid solutions based on cadmium sulfides and selenides are being investigated at the Institut fiziki AS USSR (Institute of Physics AS USSR) (Ref. 21). Further work in this field was conducted at the Institut im. Karpova (Institute im. Karpov) (Ref. 22) and in several laboratories of the Institut poluprovodnikov AN SSSR (Semiconductor Institute at the AS USSR). Since 1958, work on the physico-chemical analysis of semiconductor systems has been going on in several laboratories of the Institut obshchey i neorganicheskoy khimii im. N.S. Kurnakova AN SSSR (Institute of General and Inorganic Chemistry im. N.S. Kurnakov AS USSR). In 1957 Academician I.P. Bardin in a paper presented at the Conference on Structural Diagrams of Metal Systems compared the number of studied systems with the number of those theoretically possible (see table). Available data on binary and more complex systems, their structural diagrams, semiconductor properties as a function of the composition change, are listed in detail. The Bi-Te system is mentioned, studied more completely. X

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## A Physico-Chemical Analysis of Semiconductors

ly by Abrikosov and Bankina (Ref. 30). The latter found four phases instead of one from data of previous investigations (Fig. 2), after a lengthy homogenization of the alloys. Fig. 3 shows the curves composition versus thermo-emf and composition versus electroconductivity. The special points on these curves corresponding to the phases found on the diagram confirm the existence of these phases and point to the particular changes of the semiconductor properties when shifting from one phase to another. The Sb-Te system was also studied and the  $\beta$ - and  $\gamma$ -phases, not known previously, were found (Ref. 31). Fig. 4 shows that the emf of the alloys changes in accordance with the nature of the phases. In the system Ge-Si, the structural diagram of which was investigated as early as 1939 (Ref. 32), an unlimited mutual solubility of the components in the liquid and solid state was detected. Fig. 5 shows the change in the width of the forbidden zone ( $\Delta E$ ) with the composition. The smooth curve  $\Delta E$  versus composition reflects the presence of continuous solid solutions in the system, but its shape is not

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# A Physico-Chemical Analysis of Semiconductors

linear, which according to calculations made previously (Ref. 34) is due to the difference in the zonal structures of silicon and germanium. The system tantalum-tellurium (Ref. 19) was investigated and measurements were made of the change in the thermo-emf with the composition (Fig. 6): The minima on the curve thermal emf versus composition correspond to the  $TaTe_3$  compound and the  $\alpha$ -phase. The temperature change of the electroconductivity for a number of phases from 20 to 440°C was studied in various binary systems of nickel and cobalt sulfides and selenides (Ref. 35). It was found that most phases behave like metals or semi-metals, except the  $NiS_2$  phase with a semiconductor type of electroconductivity, and the  $\beta$ -CoS and  $\beta$ -NiSe phases, which have a tendency to the semiconductor type of conductivity. The author lists various systems amongst the many which were studied by the different authors and are known to have semiconductor properties: Zn-Sb (Ref. 20), Co-Te (Ref. 36), Bi-Sb (Ref. 37), Ga-As, In-As, In-P (Ref. 38), Sn-Se, Zn-Se, Cd-Se, Ag-Se (Ref. 39), Al-As, Ga-As, Ga-Sb (Ref. 40), In-As (Ref. 41), Tl-Se, Tl-Te (Ref. 42), In-Te, Ga-Te (Ref. 43). It is pointed out that in most cases

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# A Physico-Chemical Analysis of Semiconductors

the semiconductor properties were studied for only some of the compounds formed in these systems (InSb, InP, GaAs, etc.), and the diagrams composition versus semiconductor properties were not investigated. In the synthesis of semiconductor alloys of ternary systems only the structural diagrams and semiconductor properties of a few cross-sections or "cuts" joining the points of the composition of the various compounds formed in binary systems were studied. It is pointed out that in some cases binary systems, where semiconductor compounds are formed, are characterized by the fact that there is only one clearly expressed compound in them, which melts at a temperature much higher than that of the initial components, and which forms with these components degenerated eutectics, e.g., Al-Sb (Fig.7) or Ga-As. Systems with such components can be considered as pseudo-binary, especially if they are capable of forming solid solutions due to their structural similarity and closeness of the constant lattices. The SnTe-PbTe system is considered one of these pseudo-binary types (Ref.44). Fig.8 shows the change of the electroconductivity and thermal emf of alloys produced from samples with a

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positive type of conductivity. In the case of interaction between PbTe with a negative type of conductivity and SnTe with only a p-type of conductivity, the thermo-emf curve of the alloys has a complex nature and changes its sign in the middle part of the system. In studying the SnTe-GeTe system, which is a cut of the ternary system Sn-Ge-Te (Ref. 45), it was found that there are solid solutions with a minimum (Fig. 9). Fig. 10 is a structural diagram of the system PbSe-PbTe (Ref. 46) and PbTe-Bi<sub>2</sub>Te<sub>3</sub>, SnTe-Bi<sub>2</sub>Te<sub>3</sub> (Ref. 47). Fig. 11 shows the curves of the dependence of the change of the thermo-emf and the electroconductivity on the composition in the system. The AlSb-Al<sub>2</sub>Te<sub>3</sub> cut was investigated in the work of Mingalsvskaya (Ref. 48) and its structural diagram is given in Fig. 12. A measurement of the thermo-emf of the alloys showed that small additions of tellurium to the AlSb tellurium change the sign of conductivity to the n-type, which is maintained until a 20 weight % content of Al<sub>2</sub>Te<sub>3</sub> in the alloys is reached. Subsequently, the samples revert back to the p-type of conductivity. Goryunova and Kolomiya made a study of a number of systems, the components of which were compounds

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## A Physico-Chemical Analysis of Semiconductors

of the elements of the third and fifth group ( $A_{III}B_V$ ) of the periodic table, as well as of the second and sixth ( $A_{II}B_{VI}$ ) and the third and sixth ( $A_{III}B_{VI}$ ). The question as to the expediency of combining the semiconductor properties into the different crystallo-chemical groups was raised by the latter two authors in their work on the crystallo-chemistry of substances with a zinc blende structure (Ref. 49). In summarizing the data on the isomorphism of substances with a prevalent covalent bond the authors reached the conclusion that isomorphism appears only if there is a closeness of the lattice parameters in the substances and also of the nature of the bond.  $AlSb-GaSb$  is given as one of the best studied systems of this kind (Ref. 28). It is stated that Soviet scientists investigated this system more thoroughly (Ref. 50-52) and proved the presence of continuous solid solutions in it. It was shown that for their formation a lengthy homogenization of the alloys is necessary (Fig. 13). A study of the semiconductor properties of this system's alloys showed that the width of the forbidden zone ( $\Delta E$ ) and the electroconductivity change smoothly with a change in the composition.

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A051/A029

## A Physico-Chemical Analysis of Semiconductors

The GaSb-InSb system studied by Gorshkov (Ref. 54), thought to be eutectic by Köster and Thoma, was shown to have solid solutions, which corresponds to the data obtained by Wooley (Ref. 55). In the system ZnS-CdSe continuous solid solutions were detected (Ref. 57) and the semiconductor properties of the alloys were measured (Ref. 58). In 1960 Zherdev and Ormont determined the relationship of the width change of the forbidden zone of the solid solutions to the change in composition (Ref. 59). Other systems investigated were ZnSe-Ga<sub>2</sub>Se<sub>3</sub>, ZnTe-Ga<sub>2</sub>Te (Ref. 60) and CdSe-In<sub>2</sub>Se<sub>3</sub> (Ref. 57). In the latter system a compound of the composition 1:1 was detected, appearing on the curve of change of the mobility of the charge carriers with the composition (Fig. 14). The semiconductor properties of the alloys of the selenide and tellurium systems are described in Refs. 58-61. Regel' and Nikol'skaya (Ref. 62) describe the systems  $\beta$ HgS-HgSe,  $\beta$ HgS-HgTe and HgSe-HgTe (see Fig. 15, 16). Many works were dedicated to the systems of gallium and indium arsenides, including that of InP-InAs and GaP-GaAs and that of GaAs-InAs (Ref. 64, 65) (Fig. 17). Attention is drawn to the curve of the spectral distribution of the internal photoeffect for the compound  $Tl_2Sb_2Se_4$  which is

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shifted to the infrared region. The intermediary alloys lying to both sides of the compound fall in the region of the shorter wave lengths. Reference is made to the Tl-Se-Te system (Ref. 66) as being one of the more thoroughly investigated ternary systems. It is pointed out, however, that, although the surface of the liquidus of this system has been carefully studied, yet no investigation was made of the temperature change of the electroconductivity, except for some alloys of the phases, which proved to be semiconductors. In studying the Al-Ga-Sb, Al-In-Sb and Ga-In-Sb systems, the alloys were not brought to a state of equilibrium and it was not possible to detect the solid solutions formed in the systems; therefore, the systems were taken to be eutectic. In the case of the Pb-Sn-S, Pb-Ag-S and Bi-Cu-S systems studied in Ref. 68 measurements of the semiconductor properties of the alloys were not carried out. This also applies to the systems Ag-Cu-S, Pb-Fe-S and Pb-Cu-S, and to a recently published work (Ref. 69). Special attention is also drawn to the regions of vitrification in ternary systems. This study led to the determination of the boundaries of stable vitrification

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for most systems which include arsenic, phosphorus, bismuth chalcogenides, etc. (Fig. 18). There are less data available on quaternary systems. Köster and Thoma (Ref. 28) made a study of the quasi-ternary cut AlSb-GaSb-InSb from the quaternary system Al-Ga-In-Sb. The authors were unable to bring the alloys to a state of equilibrium and thus the pseudo-ternary system was regarded as a eutectic one. As an example of complex semiconductor oxide systems studied, the author mentions the  $\text{MnO-CuO-CoO-O}_2$ , investigated by Sheftel' (Ref. 74) (Fig. 19, 20). In conclusion the author states that the main task lying ahead in the field of the physico-chemical analysis of semiconductor substances is the establishment of bonds following certain rules between the structural diagram, crystal structure of the phases and the change in the semiconductor properties of the alloys. It is also necessary to devote special attention to the development of methods for homogenizing the alloys, which can be rather difficult in compounds with a covalent type of chemical bond, previously pointed out in 1947 by Petrov (Ref. 75). New techniques present the chemist with the problem of discovering thermally-

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stable semiconductor materials with various combinations of semiconductor properties. The latter can be accomplished by a detailed and many-sided study of more complex multi-component systems. There are 20 diagrams, 1 table and 75 references: 54 Soviet, 13 German, 8 English.

Table 1:	Systems	Number of possible systems	Number of studied diagrams
	binary	3403	622
	ternary	91881	425
	quaternary	1807 20	61
	quinternary	29034396	5

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S/078/60/005/05/36/037  
B004/B016

AUTHORS: Tananayev, I. V., Luzhnaya, N. P.

TITLE: The XVII Congress on Pure and Applied Chemistry

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 5, pp. 1178 - 1183

TEXT: The XVII Congress of the IUPAC (International Union of Pure and Applied Chemistry) took place in Munich from July 30 to September 6, 1959. It was preceded by the XX Conference of the IUPAC (August 26-29, 1959) which was attended by a Soviet delegation consisting of B. A. Kazanskiy (re-elected as representative of the USSR at the Bureau of the IUPAC), M. M. Shemyakin (elected as a member of the Section of Organic Chemistry), A. P. Vinogradov (elected as Deputy Chairman of the Section of Geochemistry), I. V. Tananayev (elected as a member of the Section of Inorganic Chemistry), Ya. I. Gerasimov, O. A. Reutov, and G. I. Rakhmaninov. Further, I. P. Alimarin was appointed Second Secretary of the Section of Analytical Chemistry. About 2200 delegates attended the Congress. In a plenary session O. A. Reutov delivered a lecture: "The Mechanism of the Formation of Metal-Carbon Bond and Some Considerations on the Reactivity of Organometallic Compounds of Heavy Metals". Concerning the work of the sections the

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The XVII Congress on Pure and Applied Chemistry

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following is reported: Section I (Organometallic Compounds): 66 lectures. A report on the work of this section will be given later on. Section II (Chemistry of Hydrides): 36 lectures. Section III (Chemistry of Actinides and Lanthanides): 51 lectures, among them D. I. Ryabchikov: "Complex Formation of Rare Earths",<sup>-1</sup> and I. V. Tananayev: "On the Composition of Ferrous Cyanides of the Rare Earths Scandium and Yttrium". Section IV (Fluorine Chemistry): 21 lectures. Section V (Preparation of Pure Metals): 16 lectures. Section VI (Non-aqueous Solvents): 16 lectures. Section VII (Homogeneous and Heterogeneous Gas Equilibria): 9 lectures. Section VIII (Semiconductors and Non-metallic Compounds): 24 lectures. Section IX (Ternary Oxides and Sulfides): 35 lectures, among them N. P. Luzhnaya: "The Phase Diagram of the Ternary System  $\text{CaO} - \text{P}_2\text{O}_5 - \text{SiO}_2$ ". Section X (Various Communications): 101 lectures, among them Yu. K. Delimarskiy (Kiyev): "Polarography of Melted Salts", L. K. Lepin' (Riga): "On the Kinetics of Exchange Reactions Between Metals and Water", and Ya. I. Gerasimov: "Thermodynamic Properties of Iron- and Cobalt Antimonides". Reactions at ultrahigh pressures were dealt with at a symposium. I. R. Krichevskiy reported on: "Thermodynamics of Systems at High and Superhigh Pressures".

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S/030/60/000/012/003/018  
B004/B056

AUTHOR: Luzhnaya, N. P., Doctor of Chemical Sciences

TITLE: The Development of Physico-chemical Analysis

PERIODICAL: Vestnik Akademii nauk SSSR, 1960, No. 12, pp. 14 - 19

TEXT: The author stresses the close connection between the problems of economy and those of physico-chemical analysis which were developed in accordance with the demands made by technical engineering, metallurgy and halurgy. The following progresses are mentioned: The investigation of liquid solutions by measuring light absorption, of surface tension, the depression of the fusion point, which facilitates determining the forming of complex ions. In extraction processes, the effects of self-salting out, and the presence of a threshold concentration were found. The application of physical-chemical analysis in analytical chemistry is briefly mentioned. The improvement of thermal analysis led to high-precision thermography. Considerable value must be attached to the combination of thermography with micro-motion-picture-taking, dilatometry and volume measurement within a wide temperature range. The investigation of the

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The Development of Physico-chemical Analysis

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system Fe - Cr - Al led to heat-resistant alloys, which replaced platinum in the resistance furnace. The study of systems from rare earths promoted the production of heat-resistant and corrosion-resistant alloys. The demands made by atomic engineering led to the investigation of systems containing Th, U, and Pu. Mention is made of the determination of the phase diagrams of alloys of difficultly fusible metals by studying the microstructure, the fusibility, the X-ray structure of conductivity at high temperatures, measuring the emf and the Hall effect. On the basis of crystallochemical data, the equations were derived for multicomponent systems of molten salts, according to which the exchange reactions develop. The investigations were extended up to temperatures of more than 2000°C. Multicomponent systems of solutions were studied up to temperatures of 600 - 650°C and pressures of up to 300 - 350 atm. The results obtained are of importance for thermal power engineering, for geochemistry, and hydrothermal synthesis of monocrystals. The investigation of the five-component system Na, Mg, K||SO<sub>4</sub>, Cl is important for the utilization of natural salt lakes. As the most important tasks to be performed in future the following are mentioned: Extending of the theory of the chemical

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The Development of Physico-chemical Analysis S/030/60/000/012/003/018  
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diagram; the application of thermodynamics and statistical physics in physico-chemical analysis; investigation of the limits of applicability of the classical laws of chemistry, the applicability of the conception of the molecule and valency; development of the general theory of the solution and definition of the conception of the phase. Special tasks are: The application of the conceptions of solid state physics upon phase diagrams and the inner structure of metals and alloys; investigation of the influence exerted by neutron radiation and ultrasonics, investigation of the corrosion processes; research work in the field of semiconductors; extension of the requirements of salt- and alkali solutions, as well as of the silicates to high temperatures and pressures; the use of salt melts as solvents for difficultly soluble oxides; physico-chemical analysis of organic and inorganic polymers. Besides, the further treatment of the already voluminous experimental data in form of monographs is being described as being useful. I. I. Chernyayev, N. S. Kurnakov, and S. F. Zhemchuzhnyy are mentioned. There are 18 Soviet references.

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LUZHNAJA, N.P.; KOVALEVA, I.S.

Solubility of thorium and potassium oxalates in water at 25°.  
Zhur.neorg.khim. 6 no.6:1436-1439 Je '61. (MIRA 14:11)  
(Thorium oxalate) (Potassium oxalate)

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S/078/61/006/006/007/013  
B110/B206

AUTHORS: Luzhnaya, N. P., Kovaleva, I. S.

TITLE: The solubility in the system  $\text{Na}_2\text{CO}_3 - \text{Th}(\text{CO}_3)_2 - \text{H}_2\text{O}$   
at  $25^\circ\text{C}$

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 6, 1961, 1440-1442

TEXT: The investigation of the solubility in the system  $\text{Na}_2\text{CO}_3 - \text{Th}(\text{CO}_3)_2 - \text{H}_2\text{O}$  at  $25^\circ\text{C}$  is part of the study of the quaternary system  $\text{Na, Th} \parallel \text{C}_2\text{O}_4, \text{CO}_3 + \text{H}_2\text{O}$  which is important for the production of thorium. Conforming values for the decahydrate of sodium carbonate were found for the solubility in the binary system  $\text{Na}_2\text{CO}_3 - \text{H}_2\text{O}$ . On the basis of absorption spectra, Yu. M. Tolmachev (Izv. AN SSSR, Otd. Khim. n., 5, 320 (1944)) found  $[\text{Th}(\text{CO}_3)_4(\text{OH})_2]^{6-}$  as complex ion of the thorium carbonate. First of all the authors produced sodium thorium carbonate  $\text{Na}_6[\text{Th}(\text{CO}_3)_5] \cdot 12\text{H}_2\text{O}$  in accordance with A. K. Molodkin et al. (Tr. 2. mezhdunarodnoy

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The solubility in the system ...

konferentsii po mirnomu ispol'zovaniyu atomnoy energii, 1958, p.126). The solubility of the system was investigated at 25°C.  $\text{Na}_2\text{CO}_3$  was produced from decahydrate by blowing. Equilibrium set in within two days. The liquid and solid phase were then taken for analysis and density determination, Th as  $\text{ThO}_2$ , sodium by the sulfate method, and the  $\text{CO}_3$  ionic content was determined by gravimetric analysis. Fig. 1 and Table 1 reproduce the solubility values obtained. One solubility branch corresponds to the (I) crystallization of the complex salt with 12 molecules of crystal water, the other corresponds to the (II) crystallization of the decahydrate of  $\text{Na}_2\text{CO}_3$ . (I) was investigated up to thorium carbonate concentration of 2.2% by weight. A ternary point lies at a solution concentration of 22.83% by weight  $\text{Na}_2\text{CO}_3$  and 0.86% by weight  $\text{Th}(\text{CO}_3)_2$  and the solid phases  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O} + \text{Na}_6[\text{Th}(\text{CO}_3)_5] \cdot 12\text{H}_2\text{O}$ , the composition of which was determined according to the method by Schreinemakers, the optical crystal (immersion method) and thermographic analysis. In agreement with publications, thermal effects at 34, 100, and 830°C were determined in the thermogram of

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The solubility in the system ...

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$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ . In the thermogram for  $\text{Na}_6[\text{Th}(\text{CO}_3)_2] \cdot 12\text{H}_2\text{O}$ , thermal effects were determined at 75-80°C, 100°C, 150°C, 330-375°C, and 835-860°C. Ten molecules of water are given off at 75-80°C, one molecule at 100°C and the remaining water molecule at 150°C. Sintering sets in at 835-860°C. Only sodium carbonate and thorium dioxide in the residue could be determined by aqueous extract. There are 3 figures, 2 tables, and 14 references: 6 Soviet-bloc and 8 non-Soviet-bloc. The reference to the English-language publication reads as follows: Ref. 13: Handbook of chemistry and physics, 33, 570 (1952).

SUBMITTED: December 14, 1960

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S/078/62/007/002/005/019  
B119/B110

AUTHORS: Yarembash, Ye. I., Vigileva, Ye. S., Luzhnaya, N. P.

TITLE: Study of the  $\text{Bi}_2\text{Se}_3$  -  $\text{As}_2\text{Se}_3$  section of the ternary  
Bi - As - Se system

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 2, 1962, 346 - 350

TEXT: The compounds  $\text{Bi}_2\text{Se}_3$  and  $\text{As}_2\text{Se}_3$  obtained from the elements by melting in evacuated quartz ampullas were fused in different mixing proportions (concentration interval 10%). The alloys formed were studied as follows: x-ray phase analysis, thermal analysis (with  $\Phi\text{TK}-59$  (FPK-59) Kurnakov pyrometer), determination of microhardness (with  $\text{ПMT}-3$  (PMT-3)), microstructural analysis ( $\text{МММ}-7$  (MIM-7) microscope), determination of electrical conductivity in the temperature range from +18 to +170°C ( $\text{ПППТН}-1$  (PPTN-1) and  $\text{МOM}-3$  (MOM-3) conductivity measuring instruments) and of the thermoelectromotive force (thermo-emf) as to Cu (temperature difference  $\sim 10^\circ\text{C}$ ), measuring of the Hall effect (magnetic field strength: 10,000 oersted) and of the photoelectric effect (ascertaining of the photoconductive effect by exposing the samples to a 500 w lamp at 1 m distance; Card 1/3

Study of the  $\text{Bi}_2\text{Se}_3$ ...

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investigation of the dependence of the photocurrent on the length of the light waves). The alloys were studied also in tempered state (1000 hr at 200°C). Results: The phase diagram of the  $\text{Bi}_2\text{Se}_3$  -  $\text{As}_2\text{Se}_3$  section of the ternary Bi - As - Se system is shown in Fig. 2. In solid state, the different components show only limited solubility in the eutectic.  $\text{Bi}_2\text{Se}_3$  and  $\text{As}_2\text{Se}_3$  never interact chemically. A noticeable photoconductive effect could not be found in any of the alloys. Their electrical conductivity is within the range of the conductivity of the initial components (resistivity at 293°K in ohm·cm:  $\text{Bi}_2\text{Se}_3$  crystalline  $5.8 \cdot 10^{-4}$ ;  $\text{As}_2\text{Se}_3$  amorphous  $\sim 10^{10}$ ). Alloyed with  $\text{Bi}_2\text{Se}_3$ , glassy  $\text{As}_2\text{Se}_3$  is existent merely up to  $323 \pm 5^\circ\text{C}$ ; at elevated temperatures it blends into the crystalline state. Z. A. Starikova and L. I. Antonova are thanked for making the x-ray phase analysis. There are 7 figures, 1 table, and 9 references: 3 Soviet and 6 non-Soviet. The four references to English-language publications read as follows: G. A. Geach, R. A. Jeffrey. J. Metals, 5, 1084 (1953); J. Black; E. M. Conwill, L. Leigle, C. W. Spencer. J. Phys.

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Study of the  $\text{Bi}_2\text{Se}_3$ ...

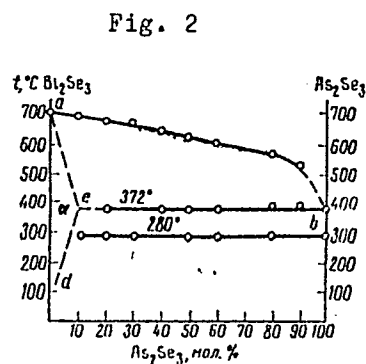
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Chem. Col., 2, 240 (1957); E. Mooser, W. B. Pearson. Phys. and Chem. Solids, 7, 65 (1958); E. Mooser, W. B. Pearson. J. Electron, 1, 629 (1956).

ASSOCIATION: Institut obshchey i neorganicheskoy khimii im. N. S. Kurnakova Akademii nauk SSSR (Institute of General and Inorganic Chemistry imeni N. S. Kurnakov of the Academy of Sciences USSR)

SUBMITTED: July 14, 1961

Fig. 2. Phase diagram of the  $\text{Bi}_2\text{Se}_3$  -  $\text{As}_2\text{Se}_3$  system. Abscissa:  $\text{As}_2\text{Se}_3$ , mole%.



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S/075/007/003/001/019  
B110 338

AUTHOR: Luzhnaya, N. P.

TITLE: Tasks of Soviet inorganic chemistry in the light of the resolutions of the XXII Party Congress of the CPSU. Scientific research tasks and prospects in semiconductor chemistry

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 3, 1962, 449 - 451

TEXT: The program announced by the XXII Party Congress of the CPSU envisages developments in radioelectronics and semiconductor engineering, the opening-up of new energy sources, the direct conversion of thermal, atomic, and solar energy into chemical and electric energy, and the development of new substances with prescribed properties. The tasks of semiconductor chemistry are (1) to investigate the relationships between semiconductor properties and composition, type of chemical bond, phase state, and crystal structure; (2) to develop new semiconductors for thermoelectric and photoelectric apparatus and plants, and (3) to find methods of production and analysis. This includes the production of semiconductor substances in high purity and the best possible ordered state (single crystals).  
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Tasks of Soviet inorganic chemistry...

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with a minimum of dislocations and lattice defects. The Khimicheskaya gruppa nauchnogo soveta po probleme poluprovodnikov pri Akademii nauk SSSR (Chemical Group of the Scientific Council on Semiconductor Problems at the Academy of Sciences USSR) is in charge of research coordination among chemists, and physicists. Research objects envisaged are: character and type of atoms and bindings, binding energy, the rôle of s-, p-, d-, and f-electrons, directed valencies, theory of chemical bond in coordination lattices, bonds in substances forming molecular lattices or polymer chains, substitution in crystals, and stoichiometric deviations. Furthermore, the bond problem shall be studied on the basis of quantum chemistry and solid state physics, using the methods of X-ray, and X-ray, electron, and neutron diffraction analysis, etc. Particular attention is to be paid to measurement of effective charge by atomic polarization and lattice vibrations. Heat of formation, fusion, and evaporation, vapor pressures of individual semiconductor compounds and respective systems are to be studied. thermochemically. Current investigations include constitution diagrams of systems containing semiconductor compounds and solid solutions, with the aim of establishing phase boundaries and relationships between composition, crystal structure, and semiconductor properties. Particular importance is

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Tasks of Soviet inorganic chemistry...

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is attached to production technologies for high-purity semiconductors, and to the precise analysis of impurity traces by radioactivation, polarography, mass spectroscopy, and other methods. The program further includes the study of electrochemical and electrophysical processes at the interfaces between semiconductors and between them and other phases - metals, liquids, and gases; and also the development of chemical methods of controlling stability, recombining capacity, and surface electron properties; mechanisms of charge transfer in organic and elemental-organic semiconductors, and the effect of irradiation on semiconductor properties, phase state, and structure.

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KOVALEVA, I.S.; LUZHNYA, N.P.

Solubility isotherm for the quaternary reciprocal system  $\text{Th}(\text{C}_2\text{O}_4)_2 + 2\text{Na}_2\text{CO}_3 \rightleftharpoons \text{Th}(\text{CO}_3)_2 + 2\text{Na}_2\text{C}_2\text{O}_4 + \text{H}_2\text{O}$  at  $25^\circ\text{C}$ . Zhur.neorg.khim. 7 no.7: 1693-1698 J1 '62. (MIRA 16:3)

(Systems (Chemistry)

(Solubility)

Concerning the reaction of antimony with selenium. S. A. Dembovskiy,  
N. P. Luzhnaya.

Report presented at the 3rd National Conference on Semiconductor Compounds,  
Kishinev, 16-21 Sept 1963

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ENT(1)/ENG(k)/ENP(q)/ENT(m)/EDS/EEC(b)-2

AFTTC/ASD/ESD-3/

IJP(C) FA-J JD/AT

ACCESSION NR: AP3005490

8/0030/63/000/008/0109/0111

AUTHOR: Luzhnaya, N. P. (Doctor of Chemical Sciences)

TITLE: Chemistry of semiconductors (presented at the plenary session of the chemical sciences section, Academy of Sciences, SSSR)

SOURCE: AN SSSR. Vestnik, no. 8, 1963, 109-111

TOPIC TAGS: semiconductor, semiconductor chemistry, chemical bond, mono-crystal, physicochemical property, chemisorption

ABSTRACT: The May 23-24 plenary session of the chemical sciences section, Academy of Sciences, SSSR, was devoted to the problems of the relationship between the structure and the nature of chemical bonds, the properties of semiconductors and the improvement of methods by which semiconductor compounds of perfect form and purity can be obtained. The session was attended by a large number of scientists from the Moscow research institutes and universities, as well as by scientists from Leningrad, Kiev, Kharkov, Voronezh, Kishinev, L'vov, and from other cities. A. N. Frankin and B. M. Vul stressed the importance of close cooperation in the areas of physics and chemistry to insure proper progress in the field of semiconductors. N. Kh. Abrikosov pointed out the effects of temperature and of the third component on the deviations

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from stoichiometry. Of great interest was the paper by N. N. Sirota on the chemical bond in semiconductors, but in view of the contradictory nature of the data it was decided to call a special conference on this topic. N. P. Luzhnaya described the production of monocrystal semiconductors based on chemical reactions in the gas phase and in melts. N. A. Goryunova and associates reported success in obtaining monocrystals of a large number of semiconductor compounds, while P. V. Klevtsov and associates presented data on optimal conditions for the crystal growth of magnetic semiconductors. I. P. Alimarin emphasized the importance of purity of issuing materials and discussed the need for adequate analytical methods for determination of impurities. It was also reported that an asymmetric distribution of electron density in crystalline lattices was linked with the appearance of semiconductor properties in compounds formed by donor-acceptor interaction of transition elements with a number of elements of groups IV, V, and VI. Investigations on the chemisorption process of oxygen and water vapors on germanium and silicon revealed the existence of two different forms of chemisorbed oxygen. The problem dealing with the interaction mechanism of various gaseous media with silicon was also discussed.

ASSOCIATION: none

SUBMITTED: 00

SUB CODE: CH

DATE ACQ: 06Sep63

NO REF SOV: 000

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ENCL: 00

OTHER: 000

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